Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

October 21, 2019
WBL-19-051

10 CFR 50.73

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 1
Facility Operating License No. NPF-90
NRC Docket No. 50-390

Subject: **Licensee Event Report 390/2019-003-00, Manual Reactor Trip Due to Main Feedwater Regulating Valve Failing Closed**

This submittal provides Licensee Event Report (LER) 390/2019-003-00. This LER provides details concerning a manual plant trip as a result of a main feedwater regulating valve failing closed. This condition is being reported as a safety system actuation of the reactor protection system and the auxiliary feedwater system in accordance with 10 CFR 50.73(a)(2)(iv)(A).

There are no regulatory commitments contained in this letter. Please direct any questions concerning this matter to Tony Brown, WBN Licensing Manager, at (423) 365-7720.

Respectfully,

Anthony L. Williams IV
Site Vice President
Watts Bar Nuclear Plant

Enclosure
cc: See Page 2

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Watts Bar Nuclear Plant

NRC FORM 366 (04-2018) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001,or by e-mail to Infocollects. Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

1. Facility Name	2. Docket Number	3. Page
Watts Bar Nuclear Plant, Unit 1	05000390	1 OF 5

4. Title

Manual Reactor Trip Due to Main Feedwater Regulating Valve Failing Closed

5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved	
Month	Day	Year	Year	Sequential Number	Rev No.	Month	Day	Year	Facility Name	Docket Number
									N/A	05000
08	31	2019	2019	- 003	- 00	10	21	2019	Facility Name: NA	Docket Number: 05000

9. Operating Mode	11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. Power Level	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
100	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. Licensee Contact for this LER

Licensee Contact	Telephone Number (Include Area Code)
Dean Baker, Licensing Engineer	(423) 452-4589

13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to ICES	Cause	System	Component	Manufacturer	Reportable to ICES
B	SJ	FCV	FISHER	Y					

14. Supplemental Report Expected	15. Expected Submission Date	Month	Day	Year
☐ Yes (If yes, complete 15. Expected Submission Date) ☒ No		N/A	N/A	N/A

Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

On August 31, 2019, at 2055 Eastern Daylight Time (EDT), the Watts Bar Nuclear Plant (WBN) Unit 1 reactor was manually tripped due to a loss of Steam Generator (SG) number 2 level control. Concurrent with the reactor trip, the Auxiliary Feedwater system actuated as designed. All Control and Shutdown rods inserted properly. All safety systems responded as designed.

This event was likely caused by diaphragm case bolt relaxation. This relaxation resulted in additional load on the bolt holes of the diaphragm, causing tearing and failure. Corrective actions include replacement of the defective diaphragm and revising the diaphragm case bolt torque requirement in the vendor manual and maintenance procedure.

This condition is being reported as a safety system actuation in accordance with 10 CFR 50.73(a)(2)(iv)(A).

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Watts Bar Nuclear Plant, Unit 1	05000390	2019	- 003	- 00

NARRATIVE

I. Plant Operating Conditions Before the Event

Watts Bar Nuclear Plant (WBN) Unit 1 was at 100 percent rated thermal power (RTP). Unit 2 was unaffected by this event.

II. Description of Event

A. Event Summary

On August 31, 2019, at 2055 Eastern Daylight Time (EDT), the Watts Bar Nuclear Plant Unit 1 reactor was manually tripped due to a loss of Steam Generator (SG) number 2 level control. Concurrent with the reactor trip, the Auxiliary Feedwater (AFW) system {EIIS:BA} actuated as designed. All Control and Shutdown rods inserted properly. All safety systems responded as designed.

This event is being reported to the Nuclear Regulatory Commission (NRC) under 10 CFR 50.73(a)(2)(iv)(A) as a safety system actuation of the Reactor Protection System (RPS) and the AFW system.

B. Status of structures, components, or systems that were inoperable at the start of the event and that contributed to the event

No inoperable structures, systems, or components contributed to this condition.

C. Dates and approximate times of occurrences

Date	Time (EDT)	Event
8/31/19	2040	Entered 1-AOI-16 due to placing number 2 SG Main Feedwater Regulating Valve (MFRV){EIIS:FCV} in manual due to issues maintaining SG 2 water level.
8/31/19	2055	Unit 1 Manual Reactor trip due to inability to maintain number 2 steam generator water level with the failure of SG 2 MFRV.
8/31/19	2056	Entered 1-E-0, Reactor Trip or Safety Injection
8/31/19	2057	Transitioned to 1-ES-0.1, Reactor Trip Response
8/31/19	2115	Transitioned to 1-GO-5, Unit Shutdown from 30 percent Reactor Power to Hot Standby

D. Manufacturer and model number of each component that failed during the event

The component that failed was the diaphragm of a Fisher Type SS-137 Reverse-Action Diaphragm actuator, diaphragm part number 2R6376X0082.

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E. Other systems or secondary functions affected

No other systems or secondary functions were affected.

F. Method of discovery of each component or system failure or procedural error

The component failure became apparent when SG 2 water level could not be maintained.

G. Failure mode, mechanism, and effect of each failed component

The MFRV closed due to a failed actuator diaphragm.

H. Operator actions

Upon identifying the SG 2 MFRV was not properly controlling SG level, operations personnel manually tripped the plant and followed operations procedures in response to a plant trip.

I. Automatically and manually initiated safety system responses

The plant was manually tripped when the SG 2 MFRV could not maintain SG 2 level. All Control and Shutdown rods inserted properly and the AFW system actuated as designed.

III. Cause of the Event

A. Cause of each component or system failure or personnel error

This event was likely caused by diaphragm case bolt relaxation. This relaxation resulted in additional load on the bolt holes in the diaphragm, causing tearing of the valve diaphragm and its failure.

B. Cause(s) and circumstances for each human performance related root cause

No human performance root causes were identified for this event.

IV. Analysis of the Event

The SG MFRVs control flow to the steam generators to maintain level within a desired operating band. The isolation of a single MFRV causes the level in the associated SG to rapidly lower. On August 31, 2019 when SG 2 MFRV failed closed, SG level lowered and operations personnel manually tripped the reactor prior to reaching the SG level automatic trip setpoint.

Investigation found the MFRV actuator diaphragm case bolt torque to be at 10 ft-lbs or less, approximately 50% of the torque value specified by the MFRV maintenance instruction. This

likely resulted in load being carried at the diaphragm bolt holes and consequently the tearing and failure of the diaphragm.

V. Assessment of Safety Consequences

This event closely matches and is bounded by the Loss of Normal Feedwater event described in the Updated Final Safety Analysis Report (UFSAR). A probabilistic risk review of this event shows the risk from this trip is very small.

A. Availability of systems or components that could have performed the same function as the components and systems that failed during the event

Not applicable.

B. For events that occurred when the reactor was shut down, availability of systems or components needed to shutdown the reactor and maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident

Not applicable.

C. For failure that rendered a train of a safety system inoperable, an estimate of the elapsed time from the discovery of the failure until the train was returned to service

Not applicable.

VI. Corrective Actions

These events were entered into the Tennessee Valley Authority (TVA) Corrective Action Program and are being tracked under Condition Report (CR) 1545537.

A. Immediate Corrective Actions

The valve diaphragm was replaced and torqued to a higher value than previously specified.

B. Corrective Actions to Prevent Recurrence or to reduce probability of similar events occurring in the future

Corrective actions to prevent recurrence will include revising the diaphragm case bolt torque requirement in the vendor manual and maintenance procedure. The remaining Unit 1 MFRVs were torqued to the revised torque value.

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VII. Previous Similar Events at the Same Site

LER 391/2019-001-00 submitted on July 18, 2019 documents an event where the reactor was manually tripped as a result of a MFRV failing closed as a result of a failed diaphragm. While the component failure is the same, this event was due to a defective diaphragm.

LER 391/2017-002-00 submitted on May 12, 2017, documents an event where the reactor was manually tripped as a result of a secondary plant transient. This event resulted when scaffold crews inadvertently depressed the local trip button for the 2A Hotwell pump, which resulted in the secondary system transient.

VIII. Additional Information

There is no additional information.

IX. Commitments

There are no new commitments.